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Holocene history of Pacific Water flux through Bering Strait recorded by smectite abundance and εNd-signature in a southern Chukchi Sea cored sequence

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The low-salinity Pacific Water (PW) entering the Arctic Ocean through Bering Strait (BS) constitutes one third of the freshwater budget of the Arctic Ocean [1], which, in its turn, impacts the Atlantic Meridional Overturning Circulation (AMOC). This PW flux is tightly controlled by the bathymetry of BS (~50 m at Present), thus, through time, by sea-level (SL) changes. In order to document PW flux changes through time, from sedimentary records, we collected five surface samples along a transect from BS to the edge of the Chukchi Sea shelf as a means to calibrate geochemical and mineralogical proxies of Pacific water fluxes. A core from the Chukchi shelf (ARC6-R09, 168.9°W, 72.0°N) has been used to reconstruct the Holocene history of this gateway. Measurements included AMS^{14}C, grain-size, XRD-clay minerals, as well as the particulate and exchangeable Nd-isotopes in specific grain-size fractions. So far smectite content and exchangeable εNd-values decrease northwards and seem the most sensitive proxies of the PW-flux. At the coring site, modern-like sediment properties have been reached progressively, first through a sharp transition from ~ 10 to ~ 4 ka BP, accompanying the deepening of BS with the rising SL, then by a gentler but continuous "neoglacial" trend towards modern values, ~14% smectite content and exchangeable εNd-value ~ -3, thus bearing a very strong Bering Sea signature. This record also suggests that the major impact of the low-salinity PW exported from the Arctic Ocean towards the North Atlantic, thus on the AMOC, was likely achieved at ~ 5 ka BP when Arctic river discharge was overall stable[2]. At last, assuming that the first order parameter governing the PW-flux is the bathymetry of the sill, a first order estimation of exchangeable εNd-value under higher SL conditions, such as those of the Last Interglacial, would indicate a sharp PW-flux increase vs present based on a direct SL-elevation-εNd relationship calibrated with Holocene data and the SL rising rate in the last decade.

[1] Woodgate and Aaggard (2005), *Geophysical Research Letters 32*, L02602.

[2] Wagner, Lohmann, & Prange (2011), *Global and Planetary Change 79*, 48-60.